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EFFoST European Federation of Food Science and Technology

CEI Central European Initiative

# HEALTHY BREAD AS AN ALTERNATIVE TO TRADITIONAL BREAD

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**ABSTRACT:** Today, bread is part of the culture and eating habits of most people and can be considered one of the most consumed foods in the world. The bread is made from a simple mixture of flour, water, salt and yeast, and it is an extremely versatile food and with a very good digestibility. Since it was first produced for thousands of years, it has undergone changes both in terms of production methods and in terms of its constitution, thus giving place nowadays to a wide variety of breads available on the market. The objectives of this study were to compare the sensory and nutritionally attributes of a special healthier bread, "Pão São", which is a recent product in the Portuguese market. Nutritionally this type of bread turned out to be a food with high nutritional value, with a low salt content (0.4%, about half of traditional bread), and being a good source of omega-3 (0.67%), fibre and protein when compared with the traditional bread. These differences are mainly due to the wide variety of raw materials selected to the preparation of this bread, including the mixture of flour (wheat flour type 150 and 65 and rye flour type 70), oatmeal, sunflower and linseed seeds, soy, fish oil extracts rich in omega 3, malt and milk protein. From the results of the sensory analysis, conducted by a panel of 40 untrained tasters aged 7 to 63 years, it was found that the traditional breads from the region closest to the marketing of healthy bread were preferred by the tasters, especially for their wood and bread flavour, as well as elasticity. The healthy bread was evaluated as a denser bread, with a more intense fermented flavour.
With this work it was concluded that the healthy bread is a nutritious and healthy bread, being currently recommended by the Portuguese Foundation of Cardiology. However from the sensory point of view, consumers still slighly prefer the traditional bread.
**Key words:** *bread, density, texture, colour, salt, sensorial analysis*

## INTRODUCTION

Bread is consumed since prehistoric times, and may have been the first food produced by humans. The advantages of a diet rich in fibres are well known, and in present times the concern about the low level of fibre intake in most diets is growing. Among the ingredients used to produce bread, flour is undoubtedly the most important. Wheat or rye flours are an excellent source of fibre, particularly insoluble fibre (Leon and Rosell, 2007), thus having positive effects on human health, such as decreasing the risk of coronary heart disease, hypercholesterolemia, obesity and diabetes (Leon and Rosell, 2007). Besides, wheat is also a major source of antioxidants like phenolic acids or flavonoids (Pathlrana and Shahidi, 2007).
According to Brandt *et al*. (2005), the amount and type of the ingredients of the dough affect its properties; among these are, besides flour, the water, fat or other additives. Also the performance of accurate methods of blending, kneading and fermentation (temperature, intensity, duration, etc.) have a marked influence on the dough quality. The bread presents better organoleptic characteristics when it is cooked from fresh flour. However, when techniques such as storage, distribution and sale of fermented, partially cooked, frozen or refrigerated dough, allows the baking of bread just before it is purchased or consumed, the bread still has a good flavour despite the aroma being slightly compromised (Brandt et al., 2005).
According Hoseney (1991) the bread quality involves the following factors: the gas concentration, elasticity, resistance of the dough and capacity of gas retention. The

prolonged fermentation with artificial yeast, such as lactic acid bacteria, can control the action of bacteria and improve the availability of nutrients (Brandt et al., 2005). The quality of the bread can be evaluated by physical, physico-chemical (macroscopic or microscopic), microbiological and sensory properties (Hoseney, 1991).
In Portugal bread is a very consumed food, presented to the consumer in many different varieties, according to the main cereals used (corn, wheat, rye, mixtures, whole flours), as well as the manufacturing process and type of fermentation (Almeida et al., 2008).

## MATERIAL AND METHODS

### Samples

Two different types of healthy bread were bought from the manufacturer “Fabrica do Pão” located in Seia, Portugal, and for each type three samples were taken for analysis. The healthy bread samples differed from one another because one contained a different ingredient, being this lupine flour. Also Regional bread samples (seven samples) from Viseu region, in Portugal, were analyzed for comparison.

### Chemical analyses

The analysis to the chemical properties done were: moisture content, water activity, ash content, crude fat, crude fiber content, protein content, all done following the official methods of AOAC (2000). The analysis of the salt content was done by the Mohr Method, being the determination of carbohydrates calculated by difference.

### Physical analyses

The physical properties evaluated in this study were: size, color, density, alveolar characterization and texture. The dimensions and volume of the loaves were measured in terms of thickness, width and length. The volume was calculated by approximating the form to an ellipsoid.
In this study, the color parameters were evaluated using a colorimeter chroma meter (Minolta, Japan) expressing the results in the CIELab system coordinates: L* which is the brightness and varies between 0 (black) to 100 (white), the a* ranges from -60 (green) to +60 (red) and b* ranging between -60 (blue) to +60 (yellow).
The alveolar characterization was done by image analysis, with the program "Image J". From each sample, 5 fresh slices were prepared with a thickness of 10 mm (pattern cutting).
Textural analysis was made by Texture Profile Analysis with a texturometer TA-XT2 from "Stable Microsystems".

### Sensorial analyses

Sensory analysis was performed in a laboratory prepared for that purpose, on the day of delivery of the samples by a panel of 40 untrained tasters, aged between 7 and 63 years, who were asked to rate the following attributes: crumb colour, crust colour, aroma (bread, firewood and fermented), taste (bread, wood or fermentation), elasticity, density, and finally the overall appreciation. In this test the taster expressed the intensity of each attribute through a scale where verbal Hedonic expressions are translated into numeric values in order to allow statistical analysis. The scale of values varied from 0 (less intense) to 10 (more intense).

## RESULTS AND DISCUSSION

After analyzing the different types of bread separately, traditional bread and healthy bread, it was intended to compare these two types of bread in terms of the different properties evaluated, chemical, physical and sensorial. The results presented are the mean, and standard deviation, of the values found for different samples of traditional bread (N = 7) or healthy bread (N = 2).

## Chemical properties

Figure 1 shows the means values, with standard deviations, of the chemical properties of the two types of bread studied. From the graphs it is observed that the traditional samples have, in average, higher moisture, carbohydrates, ash and salt contents, whereas the healthy bread samples show higher protein, fat and fibre contents. Some of these characteristics can be explained by the flours used in the manufacture of the healthy breads, which are richer in essential fatty acids (so called good fats), proteins and fibres.

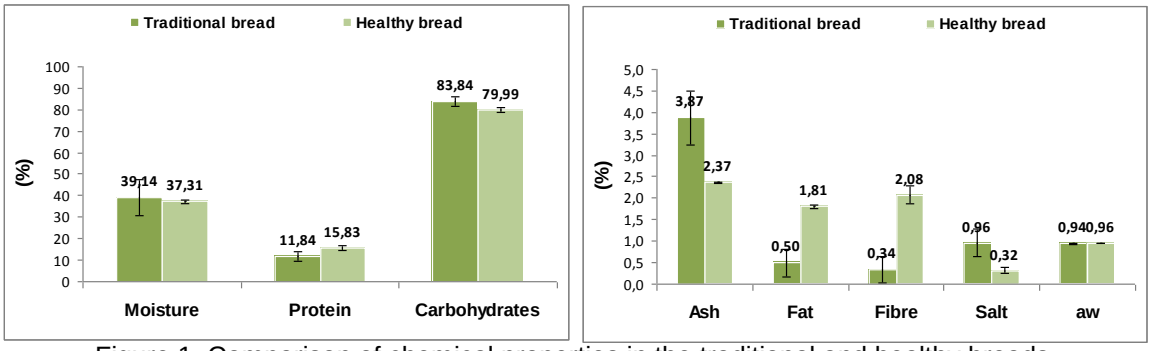


Figure 1. Comparison of chemical properties in the traditional and healthy breads.

## Physical properties

From the analysis of the graphs in Figure 2, it is evident that both types of bread do not differ substantially in terms of colour. The healthy bread presents itself darker, with lower L, either in the crust or in the crumb, which is a result of the type of flour used. Regarding a* this parameter is also higher in the healthy bread (crust and crumb), which means that the red coloration is stronger in this case. As to b*, its value is also higher in the healthy bread crumb, being slightly lower in the crust. These results indicate that the healthy bread is browner than the traditional bread.

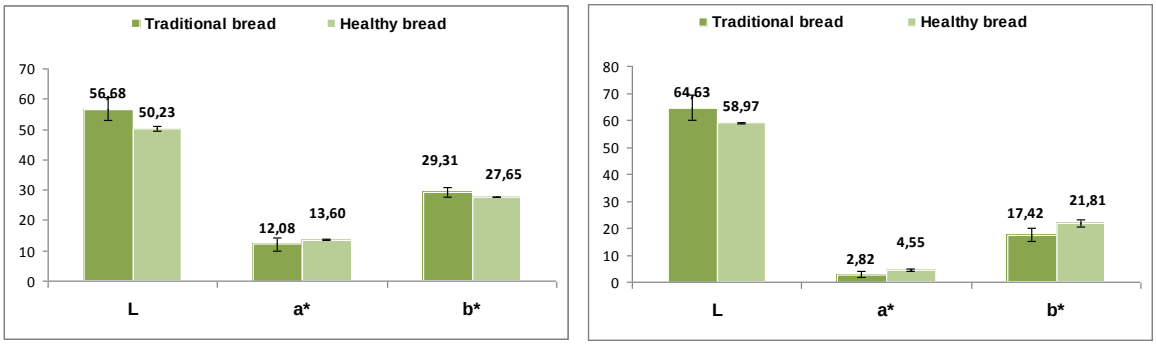


Figure 2. Colour parameters in the traditional and healthy breads. Left: crust, right: crumb.

Table 1 presents the results obtained for the physical properties examined, including alveolar characterization, for both groups of samples, traditional and healthy breads. It can be seen that, in general, the healthy samples showed higher volume and increased porosity, when compared to the traditional samples.

Table 1. Physical properties of the bread samples analyzed.

| Type of bread | Whole bread volume ($cm^3$) | Slice alveolar characterization | | | |
|---|---|---|---|---|---|
| | | Area ($pixel^2$) | Nº Alveolus | % Alveolar | Size ($pixel^2$) |
| *Traditional* | 647,69±135,56 | 1627995,86±926590,85 | 241,23±90,75 | 22,93±11,34 | 7102,86±3901,10 |
| *Healthy* | 671,22±68,09 | 2226055,90±220649,70 | 254,30±9,19 | 25,70±1,98 | 8689,90±505,02 |

*Results are given as mean ± standard deviation.*

From the analysis of Figure 3, which shows the textural properties of both types of bread studied, it is found that traditional bread show higher elasticity, higher values of springiness, while being softer, lower values of hardness and chewiness. As regards cohesiveness, this is very similar for both types of bread analysed.

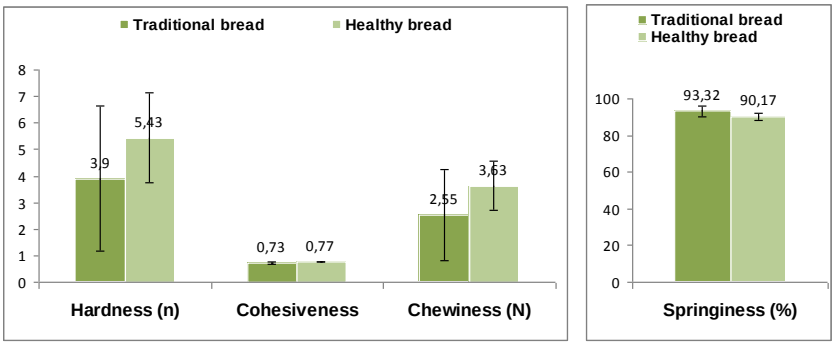


Figure 3. Textural properties in the traditional and healthy breads.

**Sensorial properties**

The graphs in Figure 4 show the results of sensory evaluations made for the two kinds of bread. Based on the results, it appears that in sensorial terms, and with regard to aroma (bread, wood, fermented), the samples of traditional bread are not distinguishable from those of the healthy bread. However, with respect to colour, either in the crust or the crumb, the healthy bread was identified as having a more intense coloration, which is in accordance with the results obtained when measuring colour. Also the healthy bread was perceived as being less tasty in terms of bread or wood taste, less elastic, more dense and finally in terms of global appreciation it was valued less than the traditional bread. Still the differences were not so important, so that in general terms both breads were considered equally acceptable.

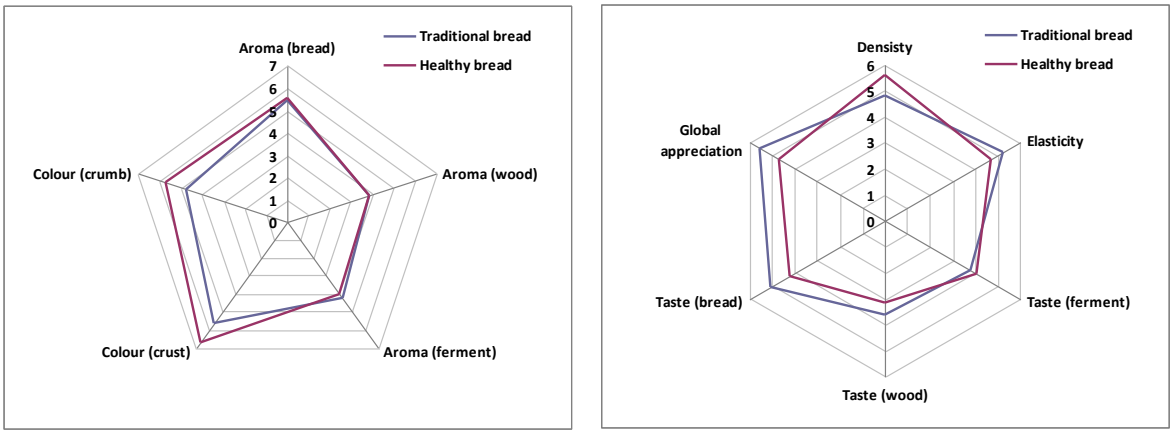


Figure 4. Sensorial evaluation of the traditional and healthy breads.

## CONCLUSIONS

The results from this work showed that both types of bread were different in terms of the different properties analyzed. In nutritional terms, the healthy bread showed higher protein content, being also much richer in terms of fibre and fat (due to the presence of important essential fatty acids). Also this type of bread had a much lower salt content, with important health benefits. In terms of physical properties, the healthy bread is browner and with increased porosity. Furthermore, this type of bread is harder when compared to the traditional bread. In sensorial terms, both breads were evaluated in a proximal way, noticing however, that the traditional bread was slightly preferred.

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